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ABSTRACT

This paper discusses the linguistic aspects of reading instruction in the elementary school language arts curriculum. The contents include: "Decoding vs. Comprehension," which discusses what constitutes reading comprehension, transformational theory of language, and grammatical knowledge the speaker of English possesses; "Syntactic Factors in Readability," which looks at the role syntax plays in processing information, the measurement of syntactic complexity, and how readability is affected by syntax; "Language Maturity and Reading Achievement," which discusses the importance of teachers understanding what language is, how teachers can judge the difficulty of sentences for young readers, and the acceleration of the development of syntactic mastery in children of low language ability; "Developing Awareness of Structural Resources," which discusses practices for developing students' awareness of syntactic clues to meaning; and "Summary." (WR)

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LINGUISTIC APPLICATIONS TO READING COMPREHENSION

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In recent years, the term "linguistic" has been tacked to many reading programs, implying that linguistic science points to a specific method of teaching young children to read. This is not so. There are several linguistic schools of thought; there is no one linguistic method.

Nonetheless, the phrase "linguistic method" should be examined and understood within its historic context. It refers to the methods and materials proposed for beginning reading instruction in the 1950's (and early 1960's) by such structural linguists as Leonard Bloomfield, Charles Fries and Henry Smith, who were influenced by behaviorist psychology. Essentially, their programs can be described as a kind of neo-phonics based on the discovery approach. Their materials focussed on regular phoneme-grapheme correspondences, contrastive spelling patterns, and the building up of high speed decoding responses. Their phonemic approach was, on one hand, an attempt to counteract the "hiss and groan" of synthetic phonics instruction, and, on the other, the "look-say" of whole sight instruction. Above all, these linguists attempted (and rightly so!) to make teachers aware of the relationship of the spoken language to the written language, and of the precise use of terms which dealt with this relationship.

These "linguistic" materials have been criticized for their pedagogical limitations, for their lack of attention to meaning. For example, the linguist Carl Lefevre cavils at such "un-English sentences as PAT A FAT CAT and A CAT BATS AT A RAT." (Lefevre, 1965). For Lefevre, natural sentences with their familiar intonation contours are the important meaning-bearing structures in English which he proposes for beginning reading materials. And Kenneth Goodman also reminds us that such artificial sentences are just as silly as the "Oh, Oh, Look, Look" type of primerese which the linguists poked fun at. Furthermore, Goodman cautions us to be on guard against the widespread, promiscuous use of the term "linguistics" in publishers' promotional materials, for "Whether the

criterion for simplification is word count, sound-symbol representation, or sentence sturcture, what results (particularly in beginning materials) is artificial language" (Goodman, 1964).

DECODING VS. COMPREHENSION

Although we know that learning to read means more than acquiring high-speed recognition responses to various spelling patterns, the work of the structural linguists is important in that it thrusts home again the essential distinction between decoding and comprehension. There is no necessary connection between reading and the comprehension of words, or, for that matter, between writing and composition. For example, John Milton's daughters learned to read aloud and take dictation in Latin for their blind father without knowing the meaning of the words; and a modern analogue is the Bar-Mitzvah boy whose oral rendition of the Hebrew script may have little or no meaning for him.

What, then, is comprehension? A theory of reading comprehension is, by necessity, contained within a theory of language processing, or communication. Comprehension is, of course, not directly observable; it is a covert mental process which we try to examine by studying its overt products, such as answers to questions on comprehension tests. Psycholinguistic research and the theories of transformational-generative grammar provide a model, a kind of window, into what goes on as the reader extracts information from spoken and written language. From a psycholinguistic point of view, reading comprehension is a dynamic interaction between the reader's linguistic expectations and the author's language production. Seen this way, reading comprehension is inextricably bound up with the functions of language and is, ultimately, a cognitive matter. In Goodman's words, reading is a "psycholinguistic guessing game"; it is a sampling process by which the reader selects minimal language cues, and on the basis of this

partial information, attempts to approximate the author's message (Goodman, 1967). These cues of written language are those of grapho-phonics (letter-sound relationships), of semantics (meaning) and of syntax (structural meaning).

As reading teachers know, it takes a considerable amount of time to attain reading proficiency. The intial stage of learning to read is not simply a "slow motion" imitation of the mature reading process (Carroll, 1970), for the processes involved in mature, skilled reading are quite different and complex. The beginning reader, characteristically decoding word by word, depends heavily on grapho-phonic clues, on auditory cues and images which evoke the spoken word. With continual practice and experience with written laguage, he relies less and less on grapho-phonic clues, on precise word identification, and more and more on grammatical, or syntactic clues which are part of his intuitive linguistic competence. (The term "intuitive" here implies that one's knowledge of the grammar of the language is acquired easily, unconsciously, without formal training.)

Transformational theory has affected reading research and methodology, especially in connection with the role of syntax in comprehension and in the readability of materials. An important aspect of transformational theory is the proposition that language has two dimensions: a surface level and a deep level. The surface level is the linear arrangement of words and grammatical units -- the way a sentence is spoken, or written. The decoding process in listening and reading takes place at this level, whereas the deep structure refers to the underlying syntactic and semantic relationships which provide interpretation. As Wardhaugh states:

> In order to fully comprehend a sentence, a reader must be able to relate what many linguists call the deep structure of that sentence, that is, its basic elements and their relationships, to its surface structure, that is, the representation of that sentence on the printed page . . . He must do more than react to the

> surface structure of a sentence alone, that is, he must do more than recognize individual letters, words, and superficial syntactic patterns. To do only this much is to bark at print. Genuine comprehension requires that each sentence be given both syntactic and semantic interpretations in depth. (Wardhaugh, 1974: 74)

While the deep structure is not always apparent, it is something that the native speaker knows intuitively. Perhaps the best way to illustrate this theory is to examine some of the grammatical knowledge that the speaker of English possesses:

(1) He can distinguish between sentences having the same surface structure but different meanings:

a. Harry told Bill to clean up the garage.

b. Harry promised Bill to clean up the garage.

In sentence (a), Bill is the deep subject of the imbedded second clause, to clean up the garage; the interpretation is that it is Bill who will do the work. In sentence (b), Harry is the deep subject of this clause; hence the interpretation that Harry will do the work.

(2) He can comprehend sentences which have different surface structures but the same meaning:

a. The policeman found the little boy.

b. The little boy was found by the policeman.

(3) He can distinguish grammatical from ungrammatical sentences:

a. Susan ate the cookies.

b. ate cookies Susan the

(4) He can comprehend as well as generate novel sentences never heard nor read before:

> There were three bears sitting in Howard Johnson's, eating pistachio ice-cream.

(5) He can recognize sentences which are semantically anomalous:

a. Buttercups are frightened by the Missouri River.
b. The house chased the encyclopedia down the street.

(6) He can provide an interpretation of sentences which are related by transformations:

a. Ellen ate the peach.
b. The peach was eaten.
c. Who ate the peach?
d. What did Ellen eat?

Thus, current research in reading maintains that comprehension involves more than just a linear left-to-right identification of words in sentences and adding their meanings together, one by one, like beads on a string. Providing each sentence with deep syntactic and semantic interpretation is an active linguistic process that the reader brings to the written material. In short, there is more to reading than identifying words. The reading teacher must know how language works, must know the structural units of sentences and the links between sentences which provide grammatical and semantic cohesiveness.

SYNTACTIC FACTORS IN READABILITY

Perhaps one of the best explanations of the role that syntax plays in processing information has been offered by John Carroll in his book, Language and Thought:

> A sentence can be likened to a computer program; in fact, that is precisely what it is; a set of directions for the human thinking machine. The hearer or the reader of a sentence constructs its meaning by following the "directions" it provides in terms of the concepts and conceptual relationships it evokes, also utilizing whatever further information he may have concerning the situation in which he hears it. This process may be called interpretation (Carroll, 1964: 41-42).

If a sentence is a kind of computer program for relationships between concepts, a child's failure to identify specific grammatical structures may mean

he is not yet programmed, in developmental terms, to do so. Psycholinguistic studies of language acquisition and development reveal not only the developmental aspects of the child's mastery of syntax, but how this maturational schedule corresponds to a scale of transformational complexity in sentences. The behavioral correlates of transformational complexity have been borne out in available research on the language of elementary school children: the studies of Loban (1963), Hunt (1965) and O"Donnell et al (1967) offer independent testimony to the evolving grammatical patterns that appear in the speech and writing of pupils at different grade levels.

Written sentences that are likely to be of difficulty to young readers are not only those that are comprised of "difficult" vocabulary words, but those constructions which are syntactically complex. How do we measure syntactic complexity? Until recently, readability formulas dealt chiefly with such symtoms of reading difficulty as vocabulary difficulty, average sentence length in words, or number of prepositional phrases. But it is possible to "beat the formula" in writing materials for young readers and "remove the symtom of reading difficulty without removing the cause" (Schlesinger, 1968: 22). Bormuth points out that when authors rigidly limit sentence length in easy reading materials, the result is usually unnatural, stereotyped sentence patterns (Bormuth, 1964). In a recent article, Granowsky and Botel comment that

> . . . sentence length does not offer a reliable indication of the grammatical makeup and complexity of a sentence. As syntactic analysis based on new understandings of grammar indicate, the complexity of a sentence should not be judged from a word count of the sentence read. For example, Shakespeare's "To be or not to be: that is the question," would be rated as having primary level difficulty in terms of sentence length and vocabulary frequency (Granowsky and Botel, 1974: 32).

This can be illustrated by the following pairs of sentences, each of which contains the same number of words, yet differ markedly in syntactic complexity

and readability:

a. Remarkable is the rapidity of the motion of the wing of the hummingbird.

b. The rapidity that the motion that the wing that the hummingbird has is remarkable.

a. She thanked the producer who discovered the novel that became the script that made the movie that was applauded by the critics.

b. The movie that the script that the novel that the producer whom she thanked discovered became made was applauded by the critics.

It is not my purpose here to discuss the various formulas which have been devised to estimate the readability level of texts. However, it is noteworthy that the Syntactic Complexity Formula of Botel, Dawkins and Granowsky (1973) takes into account both the factors of transformational complexity and research dealing with children's language development and performance.

LANGUAGE MATURITY AND READING ACHIEVEMENT

Linguistic research involving decoding and recall of sentences indicates that comprehension is not only a function of sentence length, but of such factors as the number and type of transformations. This means that complex sentences are derived from simple, kernel sentences (by transformational processes of adding, embedding, deleting, etc.) and that these processes involve a hierarchy of psychological difficulties in comprehension. For example, the following sentences, by a word and syllable count, would rank at the same readability level, yet they deal with structures of increasing transformational complexity:

I.	a.	Helen baked the pie.	kernel
	b.	Helen didn't bake the pie.	negative
	c.	Didn't Helen bake the pie?	neg. question
	d.	The pie was baked by Helen.	passive
	e.	The pie wasn't baked by Helen.	neg. passive
	f.	Wasn't the pie baked by Helen?	neg. passive question

or

II.	a.	Jack was riding on his bike, and he fell down.	Coord. clauses
	b.	Jack, who was riding on his bike, fell down.	Relative clause
	c.	Riding on his bike, Jack fell down.	Participial phrase

In their description of the syntactic structures used by school children, O"Donnell (et al) find that the full relative clause occurred more often in the language of kindergarten children than its reduction to a participial phrase. Thus, in terms of transformational complexity, it is probably easier for young children to understand and produce sentences like "The man who was wearing a coat . . . than The man wearing a coat . . . or, A bird that was in the tree . . . than A bird in the tree. . ." (O"Donnell, Griffin, Norris, 1967: 92).

The teacher should be aware of the developmental stages of grammatical competence in helping children to understand the sentences and paragraphs they read. If the teaching of reading is to be fully realized as a language-based skill, then the teacher should understand what language is, and how it works, for both the beginning reader and the proficient reader. Although the child has productive command over most of the major syntactic patterns in his speech by the time he learns to read, his span of grammatical attention is short, and he still has some distance to go in achieving snytactic maturity. For example, in English the order of words is a very important grammatical signal. It is so important that when it is reversed, as in a passive construction, the sentence becomes more difficult to process. In her study of young children's language, Jean Gleason describes how first graders ignore the little words that signal the passive and pay attention to the word order instead:

> If, for instance, you show first graders two pictures, one of a cat chasing a dog and the other of a dog chasing a cat, and tell them to point to the picure called "the cat is chased by the dog," only about half will respond correctly (Gleason, 1967: 18).

Perhaps one of the simplest ways to judge the difficulty of sentences for

the young reader is to count the number of verbs. Thus, sentences of this type are likely to give young readers some difficulty:

The little girl holding the dog is waiting for the doctor.

Who is waiting for the doctor? The dog? The girl? The beginning reader may be confused, because of the intervening verb positioned between the subject and the main verb. The linguist Robert Allen suggests that we can help the beginning reader by printed materials in which the boundaries between sentence units are marked by larger spaces than the spaces used for separating words, thus grouping words into grammatical units. It is his contention that even complex subject phrases set off this way would be understood by the child in the same way that he understands them in spoken language because they have been set off from their predicates by the intonational signals of speech. But since the writing system does not provide the structural signals of intonation (stress, pitch, pause), such spaces would offer a printed clue to the recognition of grammatical units. And, as the child becomes more proficient in comprehending the relationships between sentence units, these spaces would be gradually reduced until they were of normal size which mark word boundaries.

The study of the developmental sequence of children's oral and written language in relation to reading comprehension has been the subject of several investigations. (Ruddell, 1965: Peltz, 1973: Smith, 1971). Smith's study measured the effect of transformed syntactic structures on reading comprehension. He constructed a set of passages which represented the characteristic sentence structures found in the writing of students in grades four, eight, twelve and in that of skilled adults. Vocabulary, content and sentence length were held constant, but an increasing level of syntactic complexity was achieved by means of subordination and by embedding transformations of various kinds. It was found, using the cloze procedure, that the material best understood by the student

was the passage which was closest to his own productive syntactive level. For example, the more mature eighth grade pupil found it easier to read and understand the eighth grade passage than the simpler fourth grade passage.

These investigations give evidence of the relationships between measures of maturity in language performance and reading achievement. Furthermore, these studies indicate that we're dealing not so much in terms of reading, but with strategies for dealing with problems of language. There are different language structures for different students at different times, and problems of reading comprehension involve strategems for dealing with these.

It has been pointed out by linguists that if a pupil reads every word in a sentence as if it were an item on a grocery shopping list, then he has not identified such syntactic units as noun phrases, verb phrases and sentence adverbials. When this happens, reading teachers often assume that such poor phrasing is the result of faulty diction, or of not understanding what the individual words mean, and the child is encouraged to "read the words as if you were talking to a friend" or to "think what the words mean as you read." As one linguist states:

> These assumptions are correct as far as they go. The child's oral reading is faulty as regards intonation, and he probably has failed to understand any sentence that he reads as a list of syntactically unrelated items. But both of these facts are merely superficial symtoms of an underlying failure to identify grammatical structures (Reed, 1969: 81-82).

Can we accelerate the development of syntactic mastery in children of low language ability? Keeping in mind that there is a hierarchy of difficulty involved in both the production and interpretation of various grammatical structures, it may be possible to increase a pupil's syntactic fluency by a program that will encourage his understanding and use of more complex sturctures. It is not suggested that we try to develop such fluency by means of teaching elementary

school pupils the formal, abstract rules of grammar -- be they the rules of traditional grammar, structural grammar or transformational grammar. Learning such rules doesn't work; it is a waste of time. But we can provide opportunities for children to use language in the classroom in a variety of ways that will stimulate thinking; by having them channel and organize their thoughts in writing, in discussions and in various pupil interactions in such ways that the give and take of language fosters cognitive growth. As Bruner pointed out, language is a major instrument of thought; thus, reading programs ought to include opportunities to develop expressions of clarity and logical thinking.

DEVELOPING AWARENESS OF STRUCTURAL RESOURCES

Reading programs should contain teaching materials which heighten the pupil's awareness of the structural resources of the language. As Loban's longitudinal study indicates, grammatical growth for the school age child is not in the use of a greater variety of sentence patterns but in the use of greater flexibility within the various patterns. Not only does the length of clauses increase, but he uses an increasing number of modifiers and complements. He is able to consolidate grammatical structures by subordination and deletion of redundant items. Mellon's study with Junior High students in transformational sentence-combining indicates that syntactic fluency may be achieved through such practice, and he recommends it for use in the elementary grades (Mellon, 1969). The cloze procedure seems to offer a promising technique for improving a pupil's awareness of linguistic structure and improving reading comprehension, if such practice is reinforced by pupil discussion of responses (Jongsma, 1971).

Another interesting practice for developing a student's awareness of syntactic clues to meaning is that of sentence paraphrases. Marcus (1971) developed a paraphrase test for intermediate grade children to determine a pupil's under-

standing of syntactic clues to meaning in written sentences. He compiled a list of 17 structures (which various researchers had suggested as causes of comprehension problems in reading), categorized them and adapted them to a multiple choice question format. The ability to discriminate between sentence structures that had the same or different meanings were used as the underlying principle. The information gained from such a diagnostic instrument can help a teacher plan a program for teaching specific syntactic skills.

SUMMARY

Beyond the beginning stage of reading, a reading program should include systematic opportunity for the development of syntactic fluency. In the words of Bever and Bower (1966: 25)

> . . . by developing the child's syntactic structures and transformational rules, a reading program ought to enable children to interpret written messages that they have never seen before -- it ought to develop sentence attack, just as earlier it developed word attack; and it ought to develop grammatical, structural recognition, just as earlier it developed word recognition. If this were done, children might be able to read faster with better comprehension.

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